

Letter to the Editor

Laser-Activated Solid Protein Bands for Peripheral Nerve Repair: An In Vivo Study

To the Editor:

I read with great interest the report by Lauto et al. [1] describing laser-activated solid protein bands for peripheral nerve repair.

My comment is focused on the thermal damage after such a repair. The authors performed end-to-end repair of rat tibial nerve using four protein bands made from bovine albumin and the dye indocyanine green. In combination with laser energy from a GaAlAs laser diode the protein solder and the perineurium was denatured to form a bond. The authors state that "the inner axons remained structurally normal, with little or no evidence of thermal injury" directly after repair. In Figure 3, a longitudinal section of a welded nerve is shown directly after repair, with the description that "axons show no evidence of thermal damage, retaining their normal wavy appearance."

Although there is only one figure provided, it is my opinion that there is definite thermal damage seen in this figure, located on both sites directly under the perineurium. All typical features of thermal damage after laser injury are present (from severe to mild injury): hardly recognizable tissue structure (upper right corner of Fig. 3), curled axons, edematous large axons, and thrombosed vessels [2,3].

The authors state that "the axons on the edge of the fascicle are twisted and appear larger as they are in transverse section." However, there is no reason for axons to be twisted on the edge of the fascicle, unless denatured by thermal energy. This is clearly seen also at the upper right corner of Figure 3, as there is no distinct perineurium present, but only a mass of coagulated tissue and solder, which stains dark.

Also on theoretical grounds it is not possible for axons located directly under the perineurium to be free of thermal damage after welding the perineurium to a protein solder band. The perineurium has a thickness of only one or two cell layers. Therefore it is not clear for me why the authors resected the epineurium prior to nerve repair, as this epineurium can serve as a more effective barrier for thermal diffusion than the perineurium.

Nevertheless, the authors conducted a very useful study in which it is again stressed that laser-assisted nerve repair can be an effective technique for nerve repair, with main advantages including faster repair time, no foreign body reaction, and less connective tissue proliferation at the repair site [4].

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